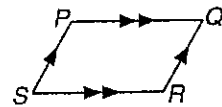


8-2

Study Guide and Intervention

Parallelograms

Sides and Angles of Parallelograms A quadrilateral with both pairs of opposite sides parallel is a **parallelogram**. Here are four important properties of parallelograms.



	If $PQRS$ is a parallelogram, then
The opposite sides of a parallelogram are congruent.	$\overline{PQ} \cong \overline{SR}$ and $\overline{PS} \cong \overline{QR}$
The opposite angles of a parallelogram are congruent.	$\angle P \cong \angle R$ and $\angle S \cong \angle Q$
The consecutive angles of a parallelogram are supplementary.	$\angle P$ and $\angle S$ are supplementary; $\angle S$ and $\angle R$ are supplementary; $\angle R$ and $\angle Q$ are supplementary; $\angle Q$ and $\angle P$ are supplementary.
If a parallelogram has one right angle, then it has four right angles.	If $m\angle P = 90$, then $m\angle Q = 90$, $m\angle R = 90$, and $m\angle S = 90$.

Example If $ABCD$ is a parallelogram, find a and b .
 \overline{AB} and \overline{CD} are opposite sides, so $\overline{AB} \cong \overline{CD}$.

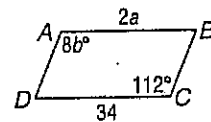
$$2a = 34$$

$$a = 17$$

$\angle A$ and $\angle C$ are opposite angles, so $\angle A \cong \angle C$.

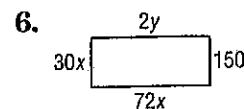
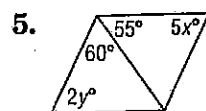
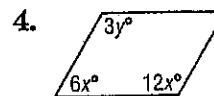
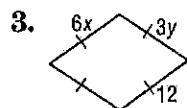
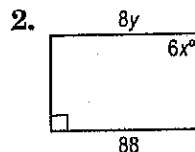
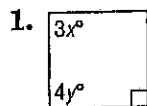
$$8b = 112$$

$$b = 14$$



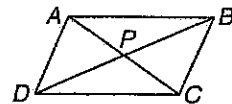
Exercises

Find x and y in each parallelogram.



8-2 Study Guide and Intervention (continued)**Parallelograms**

Diagonals of Parallelograms Two important properties of parallelograms deal with their diagonals.



	If $ABCD$ is a parallelogram, then:
The diagonals of a parallelogram bisect each other.	$AP = PC$ and $DP = PB$
Each diagonal separates a parallelogram into two congruent triangles.	$\triangle ACD \cong \triangle CAB$ and $\triangle ADB \cong \triangle CBD$

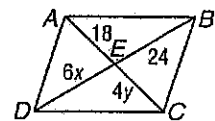
Example

Find x and y in parallelogram $ABCD$.

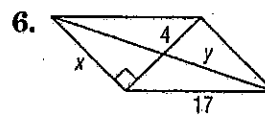
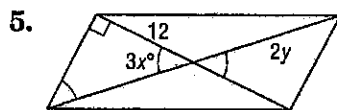
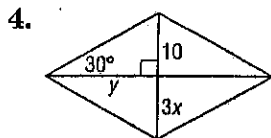
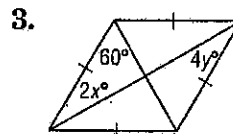
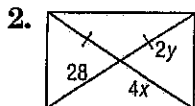
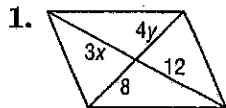
The diagonals bisect each other, so $AE = CE$ and $DE = BE$.

$$6x = 24 \quad 4y = 18$$

$$x = 4 \quad y = 4.5$$

**Exercises**

Find x and y in each parallelogram.



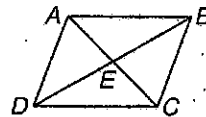
Complete each statement about $\square ABCD$. Justify your answer.

7. $\angle BAC \cong$

8. $\overline{DE} \cong$

9. $\triangle ADC \cong$

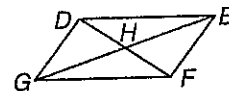
10. $\overline{AD} \parallel$



8-2 Skills Practice

Parallelograms

Complete each statement about $\square DEFG$. Justify your answer.



1. $\overline{DG} \parallel$?

2. $\overline{DE} \cong$?

3. $\overline{GH} \cong$?

4. $\angle DEF \cong$?

5. $\angle EFG$ is supplementary to ?

6. $\triangle DGE \cong$?

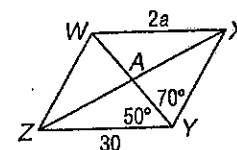
ALGEBRA Use $\square WXYZ$ to find each measure or value.

7. $m\angle XYZ =$ _____

8. $m\angle WZY =$ _____

9. $m\angle WXY =$ _____

10. $a =$ _____



COORDINATE GEOMETRY Find the coordinates of the intersection of the diagonals of parallelogram $HJKL$ given each set of vertices.

11. $H(1, 1), J(2, 3), K(6, 3), L(5, 1)$

12. $H(-1, 4), J(3, 3), K(3, -2), L(-1, -1)$

~~PROOF~~ Write a paragraph proof of the theorem *Consecutive angles in a parallelogram are supplementary*.

8-2 Practice

Parallelograms

Complete each statement about $\square LMNP$. Justify your answer.

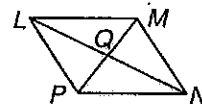
1. $\overline{LQ} \cong$?

2. $\angle LMN \cong$?

3. $\triangle LMP \cong$?

4. $\angle NPL$ is supplementary to ?

5. $\overline{LM} \cong$?



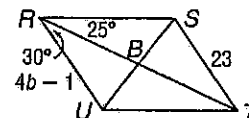
ALGEBRA Use $\square RSTU$ to find each measure or value.

6. $m\angle RST =$ _____

7. $m\angle STU =$ _____

8. $m\angle TUR =$ _____

9. $b =$ _____



COORDINATE GEOMETRY Find the coordinates of the intersection of the diagonals of parallelogram $PRYZ$ given each set of vertices.

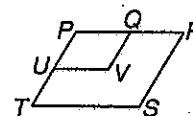
10. $P(2, 5), R(3, 3), Y(-2, -3), Z(-3, -1)$

11. $P(2, 3), R(1, -2), Y(-5, -7), Z(-4, -2)$

12. PROOF Write a paragraph proof of the following.

Given: $\square PRST$ and $\square PQVU$

Prove: $\angle V \cong \angle S$



13. CONSTRUCTION Mr. Rodriguez used the parallelogram at the right to design a herringbone pattern for a paving stone. He will use the paving stone for a sidewalk. If $m\angle 1$ is 130, find $m\angle 2$, $m\angle 3$, and $m\angle 4$.

